METEOROLOGICAL DATA REPORT

AEROBEE NASA 4.51 UG
(23 May 1966)

By

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DR-36

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ATMOSPHERIC SCIENCES LABORATORY
WHITE SANDS MISSILE RANGE, NEW MEXICO

ABSTRACT

Meteorological data gathered for the launching of Aerobee NASA 4.51 UG are presented for the National Aeronautics and Space Administration, Princeton University and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form.

CONTENTS

INTRODUCTION

Aerobee NASA 4.51 UG was launched by Naval Ordnance Missile Test Facility personnel, White Sands Missile Range (WSMR), New Mexico, at 2207 hours MST, 23 May 1966.

Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, Atmospheric Sciences Laboratory, White Sands Missile Range, New Mexico. The Ballistic Meteorologists for this firing were Gordon L. Dunaway and Ivan I. Layton.

DISCUSSION

Wind data for the first 4,000 feet above the surface were obtained from a Double-Theodolite Wind Velocity Computer System (1). Balloons released at the launch site were observed and tracked from a 2,000-foot baseline. Continuous angular data were transmitted from two electrically instrumented theodolites to a computer where the data were reduced to obtain a velocity-vs-height relationship. The computer output drives two recorders which trace north-south and east-west components on a specially designed wind velocity computer ballistic chart. It is possible to read directly from the chart both the mean wind component values and the mean ballistic wind components in the various ballistic layers.

Temperature, pressure and humidity data, along with upper wind data from 4,000 to approximately 100,000 feet above the surface, were obtained from standard rawinsonde operations.

Mean wind component values in each ballistic zone were determined from vertical cross sections by equal-area method.

Data appearing in Tables IX, X and XI, are based on the L. D. Duncan (2) theory. The "Predicted Impact" includes, when applicable, an adjustment of impact based on the experience of the Ballistic Meteorologists and the forecast of firing time wind conditions.

REFERENCES

1. "Double-Theodolite Wind Velocity Computer," UNCLASSIFIED, U. S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey, July 1959.

2. Duncan, L. D. and R. J. Ensey, November 1964: "Six Degree of Freedom Digital Simulation Model for Unguided Fin-Stabilized Rockets." ERDA-196, Environmental Sciences Directorate, United States Army Electronics Research and Development Activity, White Sands Missile Range, New Mexico.

PAYLOAD	Includes Nosecone Weight	300.5	Pounds
*UNIT WIND EFFECT	Cross	3.45	Miles/MPH
	Range	4.06	Miles/MPH
TOWER TILT EFFECT		18.28	Miles/Degree
BURNOUT	Velocity	5,399	Feet/Second
	Altitude	121,100	Feet MSL
	Time	51.8	Seconds
PEAK	Altitude	113.0	Miles MSL
	Time	224.0	Seconds
TOTAL FLIGHT TIME		525.0	Seconds
CORIOLIS EFFECT	West	5.35	Miles

TABLE I. THEORETICAL ROCKET PERFORMANCE VALUES
AEROBEE NASA 4.51 UG

* An empirical correction (85 percent of the total) has been made to the cross-unit wind effect. This correction was determined from statistical studies.

LAYERS IN FEET ABOVE GROUND	BALLISTIC FACTOR
143- 250	.185
250- 400	.115
400- 600	.100
600- 800	.062
800-1200	.053
1200-1600	.031
1600-2000	.025
2000-2500	.029
2500-3000	.023

LAYERS IN FEET ABOVE GROUND	BALLISTIC FACTOR
3000- 3500	.019
3500- 4000	.016
4000- 5000	.031
5000-10000	.096
10000-15000	.056
15000-20000	.033
20000-25000	.023
25000-30000	.017
30000-35000	.014

LAYERS IN FEET ABOVE GROUND	BALLISTIC FACTOR
35000- 40000	.009
40000- 45000	.006
45000- 50000	.012
50000- 60000	.010
60000- 70000	.009
70000- 80000	.007
80000- 90000	.008
90000-100000	.010

TABLE II. BALLISTIC FACTORS
AEROBEE NASA 4.51 UG

TIME IN MINUTES	ANEMOMETER-MEASURED WIND	
	Speed (Knots)	Direction (Degrees)
T - 15	3.0	356
T - 10	2.0	358
T - 5	1.0	348
T - Time	0.5	330
T + 5	0.5	360
T + 10	1.0	360
T + 15	0.5	358

TABLE III. ANEMOMETER-MEASURED WIND SPEED AND DIRECTION AEROBEE NASA 4.51 UG

NOTE: Wind speeds and directions are 5-minute averages centered at indicated times.

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN MILES PER HOUR											
	1 1907 MST		2 1937 MST		3 2007 MST		4 2027 MST		5 2047 MST		6 2107 MST	
	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143- 250	5.5N	9.0W	5.0N	6.0W	4.5N	7.0W	10.5N	6.0W	9.0W	6.0W	7.5N	4.0W
250- 400	4.5	11.0	7.0	10.0	5.5	8.5	12.5	8.0	10.0	10.0	11.5	6.0
400- 600	5.5	11.5	7.0	13.0	4.5	12.0	14.0	11.0	11.0	11.0	12.5	8.5
600- 800	3.0	19.0	7.5	15.0	7.5	14.5	12.5	13.5	13.5	13.0	15.5	9.0
800-1200	5.5	17.0	3.5	19.0	7.5	16.0	10.5	15.0	6.5	15.0	11.5	13.0
1200-1600	1.0	14.5	0.5	19.0	4.0	19.0	12.0	15.5	12.5	15.0	7.5	14.0
1600-2000	3.0	16.5	1.0	20.0	4.0	25.5	11.5	17.0	13.0	18.0	8.5	15.0
2000-2500	5.0	19.0	4.5	19.0	3.5	27.5	7.5	16.0	11.5	19.0	7.0	17.0
2500-3000	1.5	19.0	6.5	24.5	5.5	39.5	6.5	16.5	16.5	21.0	6.5	17.5
3000-3500	5.0	21.0	4.5	23.0	2.0	38.5	11.5	20.5	6.0	21.0	10.0	19.0
3500-4000	8.0	21.0	7.0	21.5	0.0	39.0	11.5	18.0	6.0	22.0	8.5	20.5

TABLE IV. PILOT-BALLOON-MEASURED WIND DATA
(DOUBLE-THEODOLITE METHOD)
AEROBEE NASA 4.51 UG

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN MILES PER HOUR											
	7 2122 MST		8 2135 MST		9 2147 MST		10 2157 MST		11 2208 MST			
	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143- 250	6.0N	1.0W	6.0N	0.0	6.0N	0.0	3.5N	0.0	1.0N	0.5W		
250- 400	11.5	3.0	10.5	1.0W	11.0	2.0W	3.5	2.0W	2.0	0.5		
400- 600	8.5	7.0	7.5	4.0	11.0	4.0	8.5	7.0	9.5	4.0		
600- 800	7.5	9.0	8.5	9.0	8.0	9.0	10.5	9.5	8.0	8.0		
800-1200	11.5	10.5	7.0	11.0	6.0	13.0	6.5	11.0	3.0	13.0		
1200-1600	7.0	13.5	5.5	14.0	4.5	15.0	6.0	17.0	3.0	15.0		
1600-2000	6.0	11.5	4.5	15.0	4.0	15.0	2.5	17.0	2.0	15.5		
2000-2500	8.5	12.0	2.5	16.0	3.0	19.0	5.0	19.0	3.0	22.0		
2500-3000	6.5	13.5	4.0	19.0	2.0	23.0	2.5S	22.0	4.0S	21.5		
3000-3500	10.5	22.0	13.0	28.5	1.0	24.0	1.0N	23.0	0.5N	24.0		
3500-4000	8.5	24.0	9.5	31.0	8.5	31.0	5.5	28.5	1.0	30.5		

TABLE IV. PILOT-BALLOON-MEASURED WIND DATA (Cont)
(DOUBLE-THEODOLITE METHOD)
AEROBEE NASA 4.51 UG

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN KNOTS	
	1 2110 MST	
	N-S	E-W
4000- 5000	3.0N	16.5W
5000-10000	7.5S	20.5
10000-15000	13.5	16.0
15000-20000	15.5	18.5

TABLE V. UPPER AIR DATA (4,000-20,000 FT)
AEROBEE NASA 4.51 UG

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN KNOTS					
	1 1630 MST		2* 1905 MST		3 2207 MST	
	N-S	E-W	N-S	E-W	N-S	E-W
4000- 5000	3.0S	17.5W	0.0	16.0W	4.0S	21.5W
5000- 10000	8.0	21.5	4.0S	23.5	6.5	18.0
10000- 15000	6.5	18.0	13.5	22.5	16.0	13.5
15000- 20000	10.0	28.0	5.5	30.5	18.5	22.0
20000- 25000	0.0	44.0	7.5	41.5	15.0	41.5
25000- 30000	11.0S	64.0	23.5	65.0	23.0	63.0
30000- 35000	15.0	87.0	15.5	88.0	16.0	89.5
35000- 40000	0.0	98.0	16.5	94.0	16.0	89.5
40000- 45000	0.0	68.0	0.0	64.0	10.5N	59.0
45000- 50000	8.0N	46.5	4.5S	26.5	9.0S	52.0
50000- 60000	0.0	23.0	2.0	11.0	0.0	30.0
60000- 70000	5.0S	6.0	12.5N	7.0E	0.0	14.0E
70000- 80000	15.0N	2.5E	0.0	15.0	3.0N	16.5
80000- 90000	2.5	15.0	3.5N	18.5	0.0	12.0
90000-100000	3.0	16.5	BALLOON BURST		2.5N	13.0

TABLE VI. UPPER AIR DATA (4,000-100,000 FT)
AEROBEE NASA 4.51 UG

* Rawin, telecompute data not available.

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 1630 HRS MST
ASCENSION NO. 371

UPPER AIR DATA
3914309
WHITE SANDS SITE
TABLE VII

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
3989.0	874.3	33.7	1.5	13.0	989.8	683.1	250.0	9.9	1.000248
4000.0	874.0	33.7	1.5	13.0	989.6	683.0	250.0	9.9	1.000248
4500.0	858.9	32.0	0.9	13.7	977.8	681.2	252.2	11.2	1.000244
5000.0	844.1	30.4	0.3	14.4	966.2	679.4	254.3	12.5	1.000241
5500.0	829.6	28.8	-0.3	15.1	954.8	677.5	256.4	13.8	1.000238
6000.0	815.3	27.1	-1.0	15.8	943.5	675.6	257.3	14.8	1.000234
6500.0	801.3	25.5	-1.7	16.5	932.4	673.8	257.6	15.6	1.000231
7000.0	787.5	23.9	-2.5	17.2	921.5	671.9	257.9	15.9	1.000227
7500.0	773.9	22.2	-3.3	17.9	910.7	670.0	258.3	15.4	1.000224
8000.0	760.6	20.6	-4.1	18.6	900.1	668.1	258.3	15.6	1.000220
8500.0	747.5	19.0	-4.9	19.3	889.6	666.2	257.6	16.9	1.000217
9000.0	734.6	17.4	-5.8	20.0	879.3	664.4	256.3	18.4	1.000214
9500.0	721.5	16.0	-6.1	21.4	867.7	662.8	256.6	18.2	1.000211
10000.0	708.6	14.6	-6.4	22.8	856.3	661.2	257.3	19.3	1.000208
10500.0	696.0	13.2	-6.8	24.2	845.1	659.5	257.7	19.5	1.000205
11000.0	683.5	11.8	-7.3	25.6	834.1	657.9	257.0	19.5	1.000202
11500.0	671.0	10.4	-7.8	27.1	823.1	656.2	255.6	19.4	1.000199
12000.0	658.7	8.9	-8.4	28.7	812.2	654.5	252.4	18.6	1.000196
12500.0	646.6	7.4	-9.0	30.2	801.5	652.8	249.8	18.7	1.000194
13000.0	634.7	6.0	-9.6	31.8	790.9	651.1	247.7	19.5	1.000191
13500.0	623.0	4.5	-10.3	33.3	780.5	649.4	246.2	20.7	1.000188
14000.0	611.5	3.0	-11.0	34.9	770.2	647.6	245.3	21.7	1.000185
14500.0	600.3	1.6	-11.8	36.4	760.1	645.9	246.4	21.9	1.000182
15000.0	589.1	0.2	-12.6	37.6	749.7	644.2	246.8	21.8	1.000179
15500.0	577.9	-1.1	-13.5	38.5	739.2	642.6	246.6	21.2	1.000176
16000.0	567.0	-2.5	-14.4	39.5	728.8	641.0	247.0	21.1	1.000173
16500.0	556.2	-3.8	-15.4	40.4	718.6	639.4	247.7	21.1	1.000170
17000.0	545.6	-5.1	-17.0	39.0	708.4	637.9	248.8	21.0	1.000166
17500.0	535.1	-6.3	-19.6	34.1	697.9	636.4	250.4	20.6	1.000162
18000.0	524.7	-7.4	-22.4	29.2	687.6	634.9	252.0	20.3	1.000159

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 1630 HRS MST
ASCENSION NO. 371

UPPER AIR DATA
3914309
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
18500.0	514.6	-8.6	-25.5	24.3	677.4	633.5	254.1	20.4	1.000155
19000.0	504.6	-9.7	-28.1	20.9	667.1	632.1	256.2	20.6	1.000152
19500.0	494.7	-10.7	-29.1	20.5	656.4	630.9	257.6	23.4	1.000149
20000.0	484.9	-11.7	-30.1	20.2	645.9	629.8	258.7	26.1	1.000147
20500.0	475.4	-12.6	-31.1	19.9	635.6	628.6	257.9	28.8	1.000144
21000.0	466.0	-13.6	-32.1	19.5	625.4	627.4	257.2	31.5	1.000142
21500.0	456.8	-14.6	-33.1	19.2	615.4	626.2	257.5	34.1	1.000139
22000.0	447.8	-15.8	-34.1	19.2	606.0	624.8	258.2	36.0	1.000137
22500.0	438.8	-17.3	-35.1	19.8	597.3	622.9	260.0	36.2	1.000135
23000.0	430.0	-18.3	-36.1	19.6	587.8	621.6	262.0	36.7	1.000133
23500.0	421.3	-19.1	-37.1	18.8	577.6	620.7	264.2	37.7	1.000130
24000.0	412.8	-19.8	-38.2	18.0	567.6	619.8	266.3	38.6	1.000128
24500.0	404.2	-21.1	-39.2	18.2	558.7	618.2	268.2	39.3	1.000126
25000.0	395.7	-22.4	-40.2	18.4	549.9	616.6	269.0	40.7	1.000124
25500.0	387.5	-23.7	-41.2	18.6	541.2	615.0	269.3	42.4	1.000122
26000.0	379.4	-25.0	-42.2	18.7	532.7	613.4	269.5	43.9	1.000120
26500.0	371.5	-26.3	-43.2	18.9	524.3	611.8	269.7	45.5	1.000118
27000.0	363.8	-27.6	-44.2	19.1	516.1	610.2	269.9	47.0	1.000116
27500.0	356.2	-28.9	-45.3	19.3	508.1	608.5	270.1	48.6	1.000114
28000.0	348.7	-30.2	-46.3	19.5	500.1	606.9	269.6	50.2	1.000112
28500.0	341.5	-31.5	-47.3	19.7	492.3	605.3	268.8	51.8	1.000110
29000.0	334.4	-32.8	-48.3	19.8	484.7	603.7	268.0	53.6	1.000108
29500.0	327.4	-34.1	-49.6	19.5**	477.1	602.0	267.1	55.6	1.000107
30000.0	320.3	-35.4	-53.3	14.2**	469.2	600.5	265.7	58.0	1.000105
30500.0	313.3	-36.6	-58.1	8.9**	461.5	598.9	263.7	61.1	1.000103
31000.0	306.5	-37.9	-65.9	3.6**	453.9	597.3	261.8	63.9	1.000101
31500.0	299.9	-38.9	0.	-0. **	445.9	596.0	260.1	66.7	1.000099
32000.0	293.3	-39.4	0.	-0. **	437.1	595.4	258.2	68.4	1.000097
32500.0	286.8	-39.9	0.	-0. **	428.4	594.7	256.4	69.8	1.000095
33000.0	280.5	-40.4	0.	-0. **	419.9	594.1	256.0	72.3	1.000094

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
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UPPER AIR DATA
3914309
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
33500.0	274.4	-40.9	0.	-0. **	411.6	593.4	256.1	74.4	1.000092
34000.0	268.2	-41.6	0.	-0. **	403.7	592.5	257.3	75.4	1.000090
34500.0	262.3	-42.4	0.	-0. **	396.0	591.5	259.0	78.8	1.000088
35000.0	256.4	-43.2	0.	-0. **	388.5	590.4	261.1	84.6	1.000087
35500.0	250.7	-44.0	0.	-0. **	381.1	589.4	262.7	90.0	1.000085
36000.0	245.1	-44.8	0.	-0. **	373.9	588.4	264.1	95.2	1.000083
36500.0	239.6	-45.6	0.	-0. **	366.9	587.3	264.9	95.1	1.000082
37000.0	234.2	-46.4	0.	-0. **	359.9	586.3	265.6	93.1	1.000080
37500.0	228.8	-47.7	0.	-0. **	353.6	584.7	265.7	94.4	1.000079
38000.0	223.5	-49.1	0.	-0. **	347.6	582.8	265.7	96.7	1.000077
38500.0	218.3	-50.5	0.	-0. **	341.6	581.0	265.9	96.6	1.000076
39000.0	213.3	-51.9	0.	-0. **	335.8	579.2	266.1	95.8	1.000075
39500.0	208.3	-53.3	0.	-0. **	330.1	577.3	266.2	100.0	1.000074
40000.0	203.5	-54.7	0.	-0. **	324.5	575.5	266.3	106.0	1.000072
40500.0	198.7	-56.1	0.	-0. **	319.1	573.6	266.4	103.7	1.000071
41000.0	194.1	-57.5	0.	-0. **	313.7	571.8	266.5	98.4	1.000070
41500.0	189.6	-58.6	0.	-0. **	307.9	570.3	266.2	93.7	1.000069
42000.0	185.0	-59.0	0.	-0. **	301.1	569.8	265.6	89.2	1.000067
42500.0	180.6	-59.4	0.	-0. **	294.5	569.2	265.2	84.4	1.000066
43000.0	176.3	-59.1	0.	-0. **	287.0	569.7	264.8	79.5	1.000064
43500.0	172.1	-58.6	0.	-0. **	279.5	570.3	265.7	78.1	1.000062
44000.0	168.0	-58.1	0.	-0. **	272.2	571.0	266.7	77.0	1.000061
44500.0	164.0	-58.4	0.	-0. **	266.0	570.6	268.1	77.5	1.000059
45000.0	160.0	-59.4	0.	-0. **	260.8	569.2	269.6	78.1	1.000058
45500.0	156.1	-60.5	0.	-0. **	255.7	567.9	270.3	77.5	1.000057
46000.0	152.3	-61.5	0.	-0. **	250.7	566.5	271.0	76.8	1.000056
46500.0	148.6	-62.5	0.	-0. **	245.9	565.1	271.2	75.3	1.000055
47000.0	145.0	-63.5	0.	-0. **	241.1	563.8	271.2	73.4	1.000054
47500.0	141.5	-64.5	0.	-0. **	236.4	562.4	271.4	71.3	1.000053
48000.0	138.1	-65.6	0.	-0. **	231.8	561.0	272.0	68.8	1.000052

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 1630 HRS MST
ASCENSION NO. 371

UPPER AIR DATA
3914309
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
48500.0	134.7	-65.9	0.	-0. **	226.5	560.6	272.7	66.4	1.000050
49000.0	131.4	-65.9	0.	-0. **	220.9	560.6	273.8	64.4	1.000049
49500.0	128.1	-65.9	0.	-0. **	215.4	560.6	274.9	62.4	1.000048
50000.0	125.0	-65.9	0.	-0. **	210.1	560.6	276.0	58.1	1.000047
50500.0	121.9	-65.9	0.	-0. **	204.9	560.6	277.1	53.2	1.000046
51000.0	118.9	-65.9	0.	-0. **	199.9	560.6	276.5	46.9	1.000045
51500.0	116.0	-65.9	0.	-0. **	194.9	560.6	275.0	40.0	1.000043
52000.0	113.1	-65.9	0.	-0. **	190.1	560.6	271.0	35.3	1.000042
52500.0	110.3	-64.2	0.	-0. **	184.0	562.8	265.9	31.7	1.000041
53000.0	107.6	-64.6	0.	-0. **	179.8	562.3	261.7	30.0	1.000040
53500.0	104.9	-65.4	0.	-0. **	176.0	561.2	258.2	29.5	1.000039
54000.0	102.3	-66.2	0.	-0. **	172.3	560.1	256.2	29.1	1.000038
54500.0	99.8	-67.0	0.	-0. **	168.7	559.0	256.2	28.8	1.000038
55000.0	97.4	-67.8	0.	-0. **	165.2	558.0	256.5	28.4	1.000037
55500.0	94.9	-68.5	0.	-0. **	161.7	557.0	258.5	26.9	1.000036
56000.0	92.6	-66.2	0.	-0. **	155.9	560.2	260.5	25.4	1.000035
56500.0	90.3	-66.3	0.	-0. **	152.1	560.1	261.5	23.7	1.000034
57000.0	88.1	-67.1	0.	-0. **	148.9	558.9	262.2	22.0	1.000033
57500.0	85.9	-68.0	0.	-0. **	145.8	557.7	262.0	19.5	1.000032
58000.0	83.7	-68.9	0.	-0. **	142.8	556.5	260.1	15.9	1.000032
58500.0	81.6	-69.4	0.	-0. **	139.6	555.7	258.3	12.2	1.000031
59000.0	79.6	-69.8	0.	-0. **	136.4	555.2	262.3	10.9	1.000030
59500.0	77.6	-70.2	0.	-0. **	133.2	554.7	266.6	9.8	1.000030
60000.0	75.6	-69.9	0.	-0. **	129.7	555.1	273.5	11.6	1.000029
60500.0	73.8	-67.1	0.	-0. **	124.7	558.9	281.3	14.6	1.000028
61000.0	71.9	-67.2	0.	-0. **	121.7	558.8	287.8	16.1	1.000027
61500.0	70.1	-67.3	0.	-0. **	118.7	558.7	293.4	16.8	1.000026
62000.0	68.4	-66.5	0.	-0. **	115.3	559.8	310.9	14.9	1.000026
62500.0	66.7	-64.1	0.	-0. **	111.2	562.9	339.9	10.8	1.000025
63000.0	65.1	-63.2	0.	-0. **	108.0	564.2	10.4	9.2	1.000024

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 1630 HRS MST
ASCENSION NO. 371

UPPER AIR DATA
3914309
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
63500.0	63.5	-63.4	0.	-0. **	105.5	564.0	43.6	12.0	1.000023
64000.0	62.0	-63.6	0.	-0. **	103.0	563.7	69.1	13.2	1.000023
64500.0	60.5	-63.7	0.	-0. **	100.6	563.5	69.6	8.9	1.000022
65000.0	59.0	-63.9	0.	-0. **	98.2	563.3	62.1	6.0	1.000022
65500.0	57.6	-62.5	0.	-0. **	95.2	565.1	348.4	14.3	1.000021
66000.0	56.2	-61.2	0.	-0. **	92.3	566.9	274.7	22.5	1.000021
66500.0	54.8	-61.0	0.	-0. **	90.0	567.1	299.0	13.3	1.000020
67000.0	53.5	-61.0	0.	-0. **	87.8	567.1	326.4	3.5	1.000020
67500.0	52.2	-61.0	0.	-0. **	85.7	567.1	0.4	2.1	1.000019
68000.0	50.9	-61.0	0.	-0. **	83.7	567.1	35.9	2.6	1.000019
68500.0	49.7	-60.8	0.	-0. **	81.6	567.4	62.9	6.0	1.000018
69000.0	48.5	-60.1	0.	-0. **	79.4	568.4	84.2	11.4	1.000018
69500.0	47.4	-59.4	0.	-0. **	77.2	569.3	112.6	15.8	1.000017
70000.0	46.3	-58.6	0.	-0. **	75.1	570.3	173.3	15.2	1.000017
70500.0	45.1	-57.9	0.	-0. **	73.1	571.3	234.1	14.5	1.000016
71000.0	44.1	-57.2	0.	-0. **	71.1	572.3	259.6	11.6	1.000016
71500.0	43.0	-56.4	0.	-0. **	69.2	573.2	262.1	7.3	1.000015
72000.0	42.0	-56.5	0.	-0. **	67.6	573.1	265.7	3.0	1.000015
72500.0	41.0	-56.6	0.	-0. **	66.0	572.9	318.3	5.4	1.000015
73000.0	40.1	-56.8	0.	-0. **	64.5	572.8	10.9	7.7	1.000014
73500.0	39.1	-56.9	0.	-0. **	63.0	572.6	36.6	8.4	1.000014
74000.0	38.2	-57.0	0.	-0. **	61.5	572.5	26.5	6.8	1.000014
74500.0	37.3	-57.1	0.	-0. **	60.1	572.3	16.4	5.3	1.000013
75000.0	36.4	-57.2	0.	-0. **	58.7	572.1	19.4	5.9	1.000013
75500.0	35.5	-56.2	0.	-0. **	57.1	573.5	25.1	6.8	1.000013
76000.0	34.7	-54.2	0.	-0. **	55.3	576.1	29.0	7.6	1.000012
76500.0	33.9	-52.6	0.	-0. **	53.6	578.3	26.9	7.4	1.000012
77000.0	33.1	-53.4	0.	-0. **	52.5	577.2	24.8	7.2	1.000012
77500.0	32.3	-54.2	0.	-0. **	51.5	576.2	32.9	10.2	1.000011
78000.0	31.6	-55.0	0.	-0. **	50.4	575.2	47.6	15.3	1.000011

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 1630 HRS MST
ASCENSION NO. 371

UPPER AIR DATA
3914309
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
78500.0	30.9	-55.5	0.	-0. **	49.4	574.5	62.4	20.5	1.000011
79000.0	30.1	-54.9	0.	-0. **	48.1	575.2	66.1	20.3	1.000011
79500.0	29.4	-54.4	0.	-0. **	46.9	575.9	69.5	20.1	1.000010
80000.0	28.8	-53.8	0.	-0. **	45.7	576.7	72.8	19.5	1.000010
80500.0	28.1	-53.3	0.	-0. **	44.5	577.4	75.9	18.3	1.000010
81000.0	27.4	-52.7	0.	-0. **	43.4	578.1	79.1	17.1	1.000010
81500.0	26.8	-52.1	0.	-0. **	42.3	578.9	81.4	17.3	1.000009
82000.0	26.2	-51.6	0.	-0. **	41.2	579.6	83.4	18.0	1.000009
82500.0	25.6	-51.0	0.	-0. **	40.1	580.3	85.2	18.1	1.000009
83000.0	25.0	-50.5	0.	-0. **	39.1	581.1	85.2	13.6	1.000009
83500.0	24.4	-49.9	0.	-0. **	38.1	581.8	85.2	9.1	1.000008
84000.0	23.9	-49.5	0.	-0. **	37.2	582.3	85.2	8.4	1.000008
84500.0	23.3	-49.4	0.	-0. **	36.3	582.4	85.2	11.5	1.000008
85000.0	22.8	-49.3	0.	-0. **	35.5	582.5	85.2	14.7	1.000008
85500.0	22.3	-49.3	0.	-0. **	34.6	582.6	85.2	15.0	1.000008
86000.0	21.8	-49.2	0.	-0. **	33.8	582.7	85.2	14.7	1.000008
86500.0	21.3	-49.1	0.	-0. **	33.1	582.8	85.2	14.8	1.000007
87000.0	20.8	-49.0	0.	-0. **	32.3	582.9	85.2	16.7	1.000007
87500.0	20.3	-48.9	0.	-0. **	31.5	583.0	85.2	18.7	1.000007
88000.0	19.8	-48.3	0.	-0. **	30.7	583.9	84.1	18.6	1.000007
88500.0	19.4	-46.6	0.	-0. **	29.8	586.1	81.8	16.5	1.000007
89000.0	19.0	-45.0	0.	-0. **	28.9	588.1	79.6	14.4	1.000006
89500.0	18.5	-45.0	0.	-0. **	28.3	588.1	79.1	13.9	1.000006
90000.0	18.1	-45.0	0.	-0. **	27.7	588.1	79.1	13.8	1.000006
90500.0	17.7	-45.0	0.	-0. **	27.1	588.1	78.9	13.9	1.000006
91000.0	17.3	-45.0	0.	-0. **	26.4	588.1	77.6	15.1	1.000006
91500.0	16.9	-45.0	0.	-0. **	25.9	588.1	76.2	16.3	1.000006
92000.0	16.6	-45.0	0.	-0. **	25.3	588.1	76.1	16.9	1.000006
92500.0	16.2	-45.0	0.	-0. **	24.7	588.1	77.8	16.7	1.000005
93000.0	15.8	-45.1	0.	-0. **	24.2	588.1	79.6	16.5	1.000005

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 1630 HRS MST
ASCENSION NO. 371

UPPER AIR DATA
3914309
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
93500.0	15.5	-45.1	0.	-0. **	23.6	588.1	78.5	15.6	1.000005
94000.0	15.1	-45.1	0.	-0. **	23.1	588.1	75.5	14.1	1.000005
94500.0	14.8	-45.1	0.	-0. **	22.6	588.0	72.6	12.6	1.000005
95000.0	14.5	-45.1	0.	-0. **	22.1	588.0	72.8	11.5	1.000005
95500.0	14.1	-45.1	0.	-0. **	21.6	588.0	74.5	10.5	1.000005
96000.0	13.8	-45.1	0.	-0. **	21.1	588.0	76.1	9.5	1.000005
96500.0	13.5	-45.1	0.	-0. **	20.6	588.0	74.7	9.6	1.000005
97000.0	13.2	-44.3	0.	-0. **	20.1	589.0	72.3	10.0	1.000004
97500.0	12.9	-43.6	0.	-0. **	19.6	590.0	70.0	10.4	1.000004
98000.0	12.6	-42.8	0.	-0. **	19.1	590.9	72.7	11.9	1.000004
98500.0	12.3	-42.1	0.	-0. **	18.6	591.9	76.3	13.6	1.000004
99000.0	12.1	-41.3	0.	-0. **	18.1	592.9	79.9	15.3	1.000004
99500.0	11.8	-41.1	0.	-0. **	17.7	593.2	80.2	15.2	1.000004
100000.0	11.5	-41.1	0.	-0. **	17.3	593.2	80.0	14.8	1.000004
100500.0	11.3	-41.0	0.	-0. **	17.0	593.2	79.9	14.5	1.000004
101000.0	11.0	-41.0	0.	-0. **	16.6	593.3	80.2	15.2	1.000004
101500.0	10.8	-41.0	0.	-0. **	16.2	593.3	80.5	16.0	1.000004
102000.0	10.6	-41.0	0.	-0. **	15.9	593.3	80.8	16.8	1.000004
102500.0	10.3	-40.9	0.	-0. **	15.5	593.4	80.5	15.8	1.000003
103000.0	10.1	-40.9	0.	-0. **	15.2	593.4	80.1	14.7	1.000003
103500.0	9.9	-40.9	0.	-0. **	14.8	593.4	79.7	13.6	1.000003
104000.0	9.7	-40.8	0.	-0. **	14.5	593.5			1.000003
104500.0	9.5	-40.8	0.	-0. **	14.2	593.5			1.000003
105000.0	9.3	-40.5	0.	-0. **	13.9	593.9			1.000003
105500.0	9.0	-39.5	0.	-0. **	13.5	595.2			1.000003
106000.0	8.9	-38.5	0.	-0. **	13.1	596.5			1.000003
106500.0	8.7	-37.4	0.	-0. **	12.8	597.8			1.000003

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 2207 HRS MST
ASCENSION NO. 374

UPPER AIR DATA
3914310
WHITE SANDS SITE
TABLE VIII

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
3989.0	876.0	22.0	-1.3	21.0	1031.6	669.7	0.	0.	1.000254
4000.0	875.7	22.2	-1.2	20.9	1030.4	670.0	359.6	0.1	1.000254
4500.0	860.6	28.3	1.5	17.8	991.8	677.0	340.3	3.9	1.000249
5000.0	845.8	27.3	0.2	17.1	978.1	675.9	320.9	7.8	1.000244
5500.0	831.3	26.4	-1.1	16.4	964.5	674.8	301.6	11.6	1.000239
6000.0	817.1	25.4	-2.5	15.7	951.2	673.6	282.3	15.5	1.000234
6500.0	803.1	24.5	-3.8	15.0	938.0	672.5	269.7	18.2	1.000229
7000.0	788.9	23.1	-4.5	15.6	926.0	670.9	267.7	19.0	1.000225
7500.0	775.1	21.6	-5.1	16.2	914.3	669.2	266.0	19.6	1.000222
8000.0	761.5	20.2	-5.8	16.7	902.7	667.5	264.5	20.1	1.000219
8500.0	748.1	18.7	-6.6	17.3	891.3	665.9	263.3	20.2	1.000215
9000.0	734.9	17.3	-7.3	17.9	880.0	664.2	262.2	20.3	1.000212
9500.0	722.0	15.9	-8.1	18.5	869.0	662.5	260.0	20.1	1.000209
10000.0	709.3	14.4	-8.8	19.2	858.0	660.8	257.7	19.9	1.000206
10500.0	696.4	13.0	-8.9	20.9	846.6	659.2	253.8	19.9	1.000203
11000.0	683.8	11.5	-9.2	22.6	835.5	657.5	249.7	20.0	1.000200
11500.0	671.3	10.0	-9.5	24.2	824.6	655.8	245.7	20.1	1.000198
12000.0	659.1	8.6	-9.9	25.9	813.8	654.1	241.7	20.3	1.000195
12500.0	647.2	7.1	-10.4	27.6	803.2	652.4	237.3	20.2	1.000192
13000.0	635.4	5.7	-10.9	29.2	792.7	650.7	232.8	19.9	1.000190
13500.0	623.7	4.2	-11.2	31.6	782.2	649.0	229.9	20.1	1.000187
14000.0	612.0	2.7	-11.4	34.7	771.6	647.3	227.8	20.5	1.000185
14500.0	600.5	1.3	-11.6	37.7	761.2	645.5	226.2	20.8	1.000182
15000.0	589.2	-0.2	-12.0	40.8	751.0	643.8	224.8	21.0	1.000180
15500.0	578.2	-1.7	-12.4	43.8	740.9	642.0	223.6	21.4	1.000177
16000.0	567.3	-3.2	-12.9	46.9	731.0	640.3	222.4	21.8	1.000175
16500.0	556.5	-4.6	-13.1	51.4	720.8	638.6	220.3	22.2	1.000172
17000.0	545.8	-6.0	-13.4	55.9	710.6	636.9	216.3	22.7	1.000170
17500.0	535.3	-7.4	-13.8	60.5	700.7	635.2	212.2	23.1	1.000167
18000.0	525.0	-8.8	-14.3	65.0	690.9	633.5	209.3	24.5	1.000165

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 2207 HRS MST
ASCENSION NO. 374

UPPER AIR DATA
3914310
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
18500.0	514.7	-10.1	-16.3	60.9	680.8	632.0	206.4	25.9	1.000161
19000.0	504.6	-11.3	-18.3	56.9	670.8	630.4	206.8	26.7	1.000157
19500.0	494.7	-12.6	-20.3	52.8	661.0	628.8	207.9	27.4	1.000154
20000.0	485.0	-13.5	-23.9	41.6	650.4	627.6	212.8	26.9	1.000150
20500.0	475.4	-13.8	-32.5	19.0	638.3	627.2	219.0	26.2	1.000144
21000.0	465.8	-14.8	-33.3	19.2	628.1	625.9	228.1	25.9	1.000142
21500.0	456.5	-15.9	-34.1	19.3	618.0	624.7	236.6	26.5	1.000140
22000.0	447.3	-16.9	-34.9	19.5	608.1	623.4	243.9	27.9	1.000137
22500.0	438.4	-18.0	-35.7	19.6	598.3	622.1	247.8	30.6	1.000135
23000.0	429.6	-19.0	-36.5	19.8	588.7	620.8	251.8	32.0	1.000133
23500.0	420.9	-20.0	-37.4	19.9	579.3	619.5	255.5	33.0	1.000130
24000.0	412.4	-21.2	-38.1	20.3	570.0	618.2	256.0	35.4	1.000128
24500.0	403.9	-22.3	-38.9	20.8	560.9	616.7	256.8	37.1	1.000126
25000.0	395.5	-23.5	-39.7	21.3	551.9	615.3	257.7	38.1	1.000124
25500.0	387.4	-24.7	-40.5	21.8	543.1	613.8	256.5	41.8	1.000122
26000.0	379.4	-25.8	-41.3	22.3	534.4	612.4	255.0	45.7	1.000120
26500.0	371.6	-27.0	-42.1	22.8	525.9	610.9	254.0	49.2	1.000118
27000.0	363.8	-28.3	-42.0	26.1	517.7	609.3	253.2	52.6	1.000116
27500.0	356.1	-29.8	-41.7	30.9	509.7	607.5	253.2	56.0	1.000115
28000.0	348.6	-31.2	-41.6	35.6	501.8	605.8	253.0	58.6	1.000113
28500.0	341.2	-32.6	-41.7	40.3	494.1	604.0	252.7	60.1	1.000111
29000.0	334.0	-34.0	-42.0	45.0	486.5	602.2	252.9	60.4	1.000109
29500.0	326.7	-35.3	-43.9	41.4	478.6	600.6	253.4	60.0	1.000107
30000.0	319.7	-36.6	-45.9	37.9	470.8	598.9	253.7	61.6	1.000106
30500.0	312.8	-37.3	-47.4	34.6	461.9	598.0	254.1	63.6	1.000103
31000.0	305.9	-37.8	-48.7	31.4	452.8	597.4	254.4	68.0	1.000101
31500.0	299.3	-38.3	-51.6	23.6**	444.0	596.7	254.6	71.8	1.000099
32000.0	292.7	-38.8	-57.6	12.1**	435.3	596.0	254.4	74.4	1.000097
32500.0	286.3	-39.4	-79.2	0.6**	426.7	595.4	254.0	76.0	1.000095
33000.0	280.0	-40.6	0.	-0. **	419.5	593.8	253.3	76.4	1.000093

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 2207 HRS MST
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UPPER AIR DATA
3914310
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
33500.0	273.8	-41.8	0.	-0. **	412.4	592.2	253.7	76.3	1.000092
34000.0	267.7	-42.5	0.	-0. **	404.5	591.3	254.9	76.0	1.000090
34500.0	261.8	-43.0	0.	-0. **	396.2	590.8	256.5	79.9	1.000088
35000.0	255.9	-43.4	0.	-0. **	388.1	590.2	258.3	84.9	1.000086
35500.0	250.2	-44.1	0.	-0. **	380.5	589.4	260.6	90.1	1.000085
36000.0	244.5	-45.2	0.	-0. **	373.6	587.9	262.5	94.1	1.000083
36500.0	238.9	-46.3	0.	-0. **	366.9	586.4	263.3	94.6	1.000082
37000.0	233.4	-47.5	0.	-0. **	360.3	585.0	263.7	94.7	1.000080
37500.0	228.0	-48.6	0.	-0. **	353.8	583.5	263.8	94.2	1.000079
38000.0	222.8	-49.7	0.	-0. **	347.5	582.0	263.4	93.7	1.000077
38500.0	217.7	-50.9	0.	-0. **	341.3	580.5	262.6	93.4	1.000076
39000.0	212.7	-52.0	0.	-0. **	335.2	579.0	262.2	95.3	1.000075
39500.0	207.9	-53.2	0.	-0. **	329.2	577.5	261.9	98.0	1.000073
40000.0	203.1	-54.3	0.	-0. **	323.3	576.0	261.8	94.9	1.000072
40500.0	198.4	-55.4	0.	-0. **	317.5	574.6	261.8	91.2	1.000071
41000.0	193.7	-56.2	0.	-0. **	311.1	573.5	261.3	88.4	1.000069
41500.0	189.1	-57.0	0.	-0. **	304.8	572.5	260.9	85.7	1.000068
42000.0	184.6	-57.8	0.	-0. **	298.7	571.4	260.7	86.8	1.000067
42500.0	180.2	-58.6	0.	-0. **	292.7	570.3	260.6	88.2	1.000065
43000.0	176.0	-59.4	0.	-0. **	286.8	569.3	261.3	90.6	1.000064
43500.0	171.8	-59.1	0.	-0. **	279.6	569.7	262.3	90.7	1.000062
44000.0	167.7	-58.8	0.	-0. **	272.5	570.1	263.9	86.6	1.000061
44500.0	163.6	-58.8	0.	-0. **	266.0	570.0	266.6	78.2	1.000059
45000.0	159.7	-59.5	0.	-0. **	260.4	569.2	269.9	67.1	1.000058
45500.0	155.8	-60.2	0.	-0. **	254.9	568.3	273.5	61.0	1.000057
46000.0	152.1	-60.8	0.	-0. **	249.5	567.4	276.2	57.1	1.000056
46500.0	148.4	-61.5	0.	-0. **	244.3	566.5	277.3	57.4	1.000054
47000.0	144.8	-62.2	0.	-0. **	239.1	565.6	277.7	58.2	1.000053
47500.0	141.3	-62.8	0.	-0. **	234.1	564.7	277.1	59.7	1.000052
48000.0	137.9	-63.5	0.	-0. **	229.1	563.8	276.4	60.8	1.000051

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STATION ALTITUDE 3989.0 FEET MSL
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UPPER AIR DATA
3914310
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
48500.0	134.5	-64.2	0.	-0. **	224.3	562.9	275.2	60.8	1.000050
49000.0	131.3	-64.7	0.	-0. **	219.4	562.2	274.0	60.8	1.000049
49500.0	128.0	-65.0	0.	-0. **	214.3	561.7	272.2	59.9	1.000048
50000.0	124.9	-65.4	0.	-0. **	209.4	561.3	270.3	59.1	1.000047
50500.0	121.8	-65.6	0.	-0. **	204.5	560.9	268.0	57.3	1.000046
51000.0	118.8	-64.5	0.	-0. **	198.5	562.4	265.4	55.2	1.000044
51500.0	115.9	-63.5	0.	-0. **	192.6	563.9	262.6	53.1	1.000043
52000.0	113.1	-63.5	0.	-0. **	187.9	563.9	259.4	51.0	1.000042
52500.0	110.3	-64.0	0.	-0. **	183.7	563.2	256.9	49.7	1.000041
53000.0	107.6	-64.5	0.	-0. **	179.6	562.5	255.0	49.1	1.000040
53500.0	104.9	-65.0	0.	-0. **	175.7	561.8	254.4	50.8	1.000039
54000.0	102.4	-65.5	0.	-0. **	171.8	561.1	254.5	53.5	1.000038
54500.0	99.8	-66.0	0.	-0. **	168.0	560.4	255.1	55.1	1.000037
55000.0	97.4	-66.6	0.	-0. **	164.2	559.7	255.8	56.3	1.000037
55500.0	95.0	-67.1	0.	-0. **	160.6	559.0	256.4	55.1	1.000036
56000.0	92.7	-66.6	0.	-0. **	156.3	559.6	256.7	51.2	1.000035
56500.0	90.4	-66.0	0.	-0. **	151.9	560.5	257.1	47.2	1.000034
57000.0	88.1	-66.9	0.	-0. **	148.8	559.2	258.1	40.3	1.000033
57500.0	85.9	-67.8	0.	-0. **	145.7	558.0	259.1	33.4	1.000032
58000.0	83.8	-68.7	0.	-0. **	142.7	556.7	261.8	29.5	1.000032
58500.0	81.7	-69.6	0.	-0. **	139.8	555.5	265.3	27.0	1.000031
59000.0	79.6	-70.6	0.	-0. **	136.9	554.2	269.0	25.5	1.000030
59500.0	77.6	-71.1	0.	-0. **	133.9	553.4	273.0	25.0	1.000030
60000.0	75.7	-70.2	0.	-0. **	130.0	554.7	277.9	23.3	1.000029
60500.0	73.8	-69.2	0.	-0. **	126.2	556.0	284.2	19.5	1.000028
61000.0	72.0	-68.3	0.	-0. **	122.5	557.3	295.5	15.6	1.000027
61500.0	70.2	-67.3	0.	-0. **	118.9	558.6	321.6	11.5	1.000026
62000.0	68.5	-66.4	0.	-0. **	115.4	559.9	342.9	7.9	1.000026
62500.0	66.8	-65.4	0.	-0. **	112.1	561.2	336.0	8.0	1.000025
63000.0	65.2	-64.5	0.	-0. **	108.8	562.5	328.3	8.4	1.000024

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STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 2207 HRS MST
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UPPER AIR DATA
3914310
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
63500.0	63.5	-63.5	0.	-0. **	105.6	563.7	311.5	11.0	1.000024
64000.0	62.0	-62.6	0.	-0. **	102.6	565.0	297.0	13.2	1.000023
64500.0	60.5	-61.9	0.	-0. **	99.7	566.0	312.4	10.4	1.000022
65000.0	59.0	-61.6	0.	-0. **	97.2	566.4	328.2	7.8	1.000022
65500.0	57.6	-61.3	0.	-0. **	94.7	566.8	14.1	12.8	1.000021
66000.0	56.2	-60.9	0.	-0. **	92.3	567.2	60.1	17.9	1.000021
66500.0	54.9	-60.6	0.	-0. **	90.0	567.6	69.1	15.3	1.000020
67000.0	53.6	-60.3	0.	-0. **	87.7	568.1	75.3	12.0	1.000020
67500.0	52.3	-60.0	0.	-0. **	85.5	568.5	90.9	11.1	1.000019
68000.0	51.0	-59.7	0.	-0. **	83.3	568.9	108.3	10.5	1.000019
68500.0	49.8	-59.4	0.	-0. **	81.2	569.3	127.8	10.3	1.000018
69000.0	48.6	-59.0	0.	-0. **	79.2	569.7	148.2	10.1	1.000018
69500.0	47.5	-58.7	0.	-0. **	77.2	570.2	152.6	11.7	1.000017
70000.0	46.3	-58.4	0.	-0. **	75.2	570.6	137.7	15.2	1.000017
70500.0	45.2	-58.1	0.	-0. **	73.3	571.0	126.3	17.5	1.000016
71000.0	44.2	-57.8	0.	-0. **	71.4	571.4	131.7	13.8	1.000016
71500.0	43.1	-57.5	0.	-0. **	69.6	571.8	137.1	10.0	1.000015
72000.0	42.1	-57.2	0.	-0. **	67.9	572.3	145.2	7.8	1.000015
72500.0	41.1	-56.8	0.	-0. **	66.2	572.7	153.5	5.8	1.000015
73000.0	40.1	-56.5	0.	-0. **	64.5	573.1	135.9	6.8	1.000014
73500.0	39.1	-56.6	0.	-0. **	63.0	573.0	101.6	9.7	1.000014
74000.0	38.2	-56.6	0.	-0. **	61.5	572.9	76.3	11.1	1.000014
74500.0	37.3	-56.7	0.	-0. **	60.1	572.8	71.0	9.4	1.000013
75000.0	36.4	-56.8	0.	-0. **	58.7	572.7	65.8	7.7	1.000013
75500.0	35.6	-56.9	0.	-0. **	57.3	572.6	68.6	11.3	1.000013
76000.0	34.7	-56.9	0.	-0. **	56.0	572.5	71.4	15.0	1.000012
76500.0	33.9	-57.0	0.	-0. **	54.7	572.4	70.1	13.5	1.000012
77000.0	33.1	-57.1	0.	-0. **	53.4	572.3	67.0	9.8	1.000012
77500.0	32.4	-56.8	0.	-0. **	52.1	572.7	65.8	8.0	1.000012
78000.0	31.6	-56.5	0.	-0. **	50.8	573.1	70.8	12.5	1.000011

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STATION ALTITUDE 3989.0 FEET MSL
23 MAY 66 2207 HRS MST
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UPPER AIR DATA
3914310
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
78500.0	30.9	-56.2	0.	-0. **	49.6	573.5	75.9	16.9	1.000011
79000.0	30.2	-55.9	0.	-0. **	48.4	573.9	78.1	17.5	1.000011
79500.0	29.5	-55.6	0.	-0. **	47.2	574.3	78.1	15.2	1.000011
80000.0	28.8	-55.3	0.	-0. **	46.1	574.7	78.1	12.8	1.000010
80500.0	28.1	-55.0	0.	-0. **	45.0	575.1	78.1	12.3	1.000010
81000.0	27.5	-54.7	0.	-0. **	43.9	575.5	78.1	12.2	1.000010
81500.0	26.9	-54.4	0.	-0. **	42.8	575.9	78.3	12.2	1.000010
82000.0	26.2	-54.1	0.	-0. **	41.8	576.3	80.8	12.5	1.000009
82500.0	25.6	-53.8	0.	-0. **	40.7	576.7	83.4	12.8	1.000009
83000.0	25.1	-53.5	0.	-0. **	39.7	577.1	86.4	13.3	1.000009
83500.0	24.5	-53.2	0.	-0. **	38.8	577.5	90.2	14.2	1.000009
84000.0	23.9	-52.9	0.	-0. **	37.8	577.8	94.1	15.2	1.000008
84500.0	23.4	-52.6	0.	-0. **	36.9	578.2	97.1	14.7	1.000008
85000.0	22.8	-52.3	0.	-0. **	36.0	578.6	99.3	13.4	1.000008
85500.0	22.3	-52.0	0.	-0. **	35.1	579.0	101.5	12.0	1.000008
86000.0	21.8	-51.7	0.	-0. **	34.3	579.4	102.1	11.6	1.000008
86500.0	21.3	-51.4	0.	-0. **	33.5	579.8	102.3	11.4	1.000007
87000.0	20.8	-51.1	0.	-0. **	32.6	580.2	102.0	11.3	1.000007
87500.0	20.3	-50.8	0.	-0. **	31.8	580.6	96.1	11.0	1.000007
88000.0	19.9	-50.5	0.	-0. **	31.1	581.0	90.1	10.8	1.000007
88500.0	19.4	-50.2	0.	-0. **	30.3	581.4	86.9	11.7	1.000007
89000.0	19.0	-49.9	0.	-0. **	29.6	581.8	88.9	14.9	1.000007
89500.0	18.5	-49.6	0.	-0. **	28.9	582.2	90.8	18.1	1.000006
90000.0	18.1	-49.3	0.	-0. **	28.2	582.6	90.8	18.9	1.000006
90500.0	17.7	-49.0	0.	-0. **	27.5	583.0	89.6	18.0	1.000006
91000.0	17.3	-48.7	0.	-0. **	26.8	583.4	88.3	17.2	1.000006
91500.0	16.9	-48.4	0.	-0. **	26.2	583.8	88.3	16.7	1.000006
92000.0	16.5	-48.1	0.	-0. **	25.5	584.2	88.5	16.4	1.000006
92500.0	16.1	-47.8	0.	-0. **	24.9	584.5	88.2	16.2	1.000006
93000.0	15.7	-47.5	0.	-0. **	24.3	584.9	84.1	16.7	1.000005

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STATION ALTITUDE 3989.0 FEET MSL
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UPPER AIR DATA
3914310
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
93500.0	15.4	-47.2	0.	-0. **	23.7	585.3	80.1	17.3	1.000005
94000.0	15.0	-46.9	0.	-0. **	23.1	585.7	77.5	18.4	1.000005
94500.0	14.7	-46.6	0.	-0. **	22.6	586.1	77.5	20.4	1.000005
95000.0	14.3	-46.3	0.	-0. **	22.0	586.5	77.5	22.4	1.000005
95500.0	14.0	-46.0	0.	-0. **	21.5	586.9	77.5	23.0	1.000005
96000.0	13.7	-45.7	0.	-0. **	21.0	587.3	77.5	22.6	1.000005
96500.0	13.4	-45.4	0.	-0. **	20.5	587.7	77.5	22.3	1.000005
97000.0	13.1	-45.1	0.	-0. **	20.0	588.1	77.5	21.3	1.000004
97500.0	12.8	-44.8	0.	-0. **	19.5	588.4	77.5	20.2	1.000004
98000.0	12.5	-44.6	0.	-0. **	19.0	588.7	77.5	19.1	1.000004
98500.0	12.2	-44.3	0.	-0. **	18.6	589.0	77.5	17.1	1.000004
99000.0	11.9	-44.1	0.	-0. **	18.2	589.3	77.5	15.0	1.000004
99500.0	11.7	-43.8	0.	-0. **	17.7	589.7	77.5	12.8	1.000004
100000.0	11.4	-43.6	0.	-0. **	17.3	590.0			1.000004
100500.0	11.2	-43.3	0.	-0. **	16.9	590.3			1.000004
101000.0	10.9	-43.1	0.	-0. **	16.5	590.6			1.000004
101500.0	10.7	-42.8	0.	-0. **	16.1	590.9			1.000004
102000.0	10.4	-42.6	0.	-0. **	15.8	591.3			1.000004
102500.0	10.2	-42.3	0.	-0. **	15.4	591.6			1.000003

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

RELEASE TIME (MST)			IMPACT DISPLACEMENT IN MILES DUE TO WIND								THEORETICAL IMPACT IN MILES FROM LAUNCHER	
			143-4000 FT		4000-20000 FT		20000-100000 FT		TOTAL			
RAWINSONDE		PIBAL	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
R_1 1630	R 1630	P 1907	12.5N	29.7W	7.3S	18.0W	0.9S	20.4W	4.3N	68.1W	54.2N	20.7W
R_2 1905	R 1630	P 1937	14.3N	29.5W	6.2S	19.9W	0.9S	20.4W	7.2N	69.8W	57.1N	22.4W
R_2 1905	R 1630	P 2007	13.0N	30.8W	6.2S	19.9W	0.9S	20.4W	5.9N	71.1W	55.8N	23.7W
R_2 1905	R 1630	P 2027	30.0N	24.7W	6.2S	19.9W	0.9S	20.4W	22.9N	65.0W	72.8N	17.6W
R_2 1905	R 1630	P 2047	27.2N	25.9W	6.2S	19.9W	0.9S	20.4W	20.1N	66.2W	70.0N	18.8W
R_2 1905	R_3 1905	P 2107	27.1N	19.9W	6.2S	19.9W	4.3S	17.9W	16.6N	57.7W	66.5N	10.3W
R_2 1905	R_3 1905	P 2122	22.9N	15.5W	6.2S	19.9W	4.3S	17.9W	12.4N	53.3W	62.3N	5.9W
R_2 2110	R_3 1905	P 2140	19.1N	15.0W	8.9S	15.8W	4.3S	17.9W	5.9N	48.7W	55.8N	1.3W
R_2 2110	R_3 1905	P 2147	19.3N	16.1W	8.9S	15.8W	4.3S	17.9W	6.1N	49.8W	56.0N	2.4W
R_2 2110	R_3 1905	P 2157	14.3N	16.1W	8.9S	15.8W	4.3S	17.9W	1.1N	49.8W	51.0N	2.4W
*R_1 2207	*R 2207	*P 2208	9.2N	15.7W	10.5S	15.4W	5.2S	20.3W	6.5S	51.4W	43.4N	4.0W

* = Post-Shoot Data
P = Double Theodolite Winds (143-4,000 FT)
R = Rawinsonde Winds (Above 20,000 FT)
R_1 = Rawinsonde Winds (4,000-20,000 FT)
R_2 = Rawin Winds (4,000-20,000 FT)
R_3 = Rawin Winds (Above 20,000 FT)

TABLE IX. IMPACT PREDICTION DATA
AEROBEE NASA 4.51 UG

TIME: 2207 MST
DATE: 23 MAY 1966

JACK SETTINGS FOR LAUNCHER B	West leg	28	inches
	East leg	8	inches
LAUNCHER SETTING	Tilt	3.97	degrees
	Azimuth	046.7	degrees
TILT COMPONENTS	North	2.73	degrees
	East	2.89	degrees
NO WIND IMPACT FROM LAUNCHER	North	49.9	miles
	East	47.4	miles

PREDICTED IMPACT FROM LAUNCHER	North	55.0	miles
	West	2.0	miles
PREDICTED BOOSTER IMPACT FROM LAUNCHER	Azimuth	050	degrees
	Distance	1,500	feet

RECOMMENDATION - Fire, with 90% confidence of impacting on range, based upon:
wind correction of 49 miles
1-hr wind variability 14 miles

23 May 1966/2153 MST

TABLE X. ACTUAL AND PREDICTED LAUNCH DATA
AEROBEE NASA 4.51 UG

RADAR IMPACT FROM LAUNCHER	North	24.1	miles
	West	6.9	miles
ACTUAL BOOSTER IMPACT FROM LAUNCHER	Azimuth	N/A	degrees
	Distance	N/A	feet

NOTE: The peak altitude of the rocket was only 87 miles. Therefore, the rocket impacted short of the prediction.

TABLE XI. IMPACT DATA
AEROBEE NASA 4.51 UG

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Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Electronics Command Fort Monmouth, New Jersey	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP

3. REPORT TITLE

METEOROLOGICAL DATA REPORT, AEROBEE NASA 4.51 UG

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (Last name, first name, initial)

Dunaway, Gordon L.

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
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8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
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c. DA Task IV650212A127-02	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. AVAILABILITY/LIMITATION NOTICES

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	U. S. Army Electronics Command Atmospheric Sciences Laboratory White Sands Missile Range, New Mexico

13. ABSTRACT

Meteorological data gathered for the launching of Aerobee NASA 4.51 UG are presented for the National Aeronautics and Space Administration, Princeton University and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form.

DD FORM 1 JAN 64 1473

UNCLASSIFIED
Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
1. Ballistics 2. Meteorology 3. Wind						

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